# GARDEN AND FOREST.

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## The Needs of American Forestry.

EXCEPTION was taken in our last issue to Mr. Gannett's sweeping statement that cutting off the forest from the watershed of a mountain stream increases its irrigating capacities, a statement which we believe has not been confirmed by a record of the exact flow of any stream before and after the forests had been cut from about its sources. We quote, however, the closing sentences of the same address, which contain the whole gist of the forestry question of the United States at the present time, as we understand it:

"It seems to me that, apart from the uselessness of it, Nature is planting trees at an infinitely more rapid rate than man. For every tree planted under the Timber-culture Act, or on Arbor Day, a thousand spring up of their own accord. Every deserted farm east of the plains grows up to a forest. Half of southern New England to-day is wooded, and the proportion is increasing every year, and yet in Massachusetts they have every year an Arbor Day, when the farmers turn out and solemnly plant a tree apiece."

What we need, indeed, in this country is not so much to plant trees for forests, as to take care of those which are planted without the assistance of man. The climate of eastern North America is surprisingly favorable for the growth of trees. They spring up in every part of the country, from the Atlantic Coast to the Missouri River, wherever a piece of ground is left undisturbed; and it is only in the arid parts of the country, where the rainfall is too small or too unevenly distributed to develop forest-growth, that trees are not as common as weeds in a neglected field. But in all that has been said and done in this country under the general and rather ambiguous term of "forestry," attention has been paid mainly to the subject of planting trees, while little has been said in regard to the necessity of taking care of and improving the natural woods. This, perhaps, is not surprising. There has been no question in the Eastern States until recent years of any scarcity of naturally-grown timber, or any practical necessity of husbanding the abundant stores which were encountered on every side as the tide of immigration pushed westward. It reached in time, however, the treeless prairies and plains which distinguish the interior of this continent; and the efforts of the settler were turned to securing shelter and a supply of fuel by planting trees. The treelessness of the interior of the continent directed popular attention, naturally, to tree-planting, which has gradually come to mean forestry in the minds of most Americans, as nearly all American writers and speakers upon this subject confine their remarks to this comparatively unimportant branch of forestry, and overlook the broader question of forest-protection.

What is really needed in this country, now that the most valuable products of the forests are growing scarce, is an appreciation of the value of our native forests, and a comprehension of the natural laws upon which the development of forests depends. We have yet to learn as a people that fires are destructive not only to trees, but to the productive capacity of the ground which bears trees; that animals browsing in the forest will, in time, destroy it entirely; that some trees are more valuable than others, and that the development of the valuable ones can be hastened and increased by the assistance of man. The real work for those persons who are interested in the forest as a source of material prosperity for this nation is in inculcating sound principles for the management of the forests that spring up spontaneously on all sides, and not in urging tree-planting exclusively as the only branch of forestry worthy of consideration.

Arbor Days have their uses, and they are not unimportant ones, perhaps, but the mistake is often made of considering that Arbor Day has anything to do with forestry, or can have any direct influence upon the forest-question. The educational influence of Arbor Day is already considerable, and this purely American institution is capable, no doubt, of being turned to better account even than it has been up to the present time. But we are among those who believe that the care and development of a single acre of self-sown White Pine seedlings will do more for American forestry than has ever been accomplished under the working of the Timber-culture Act or of all the Arbor Days that have ever been celebrated.

## When to Employ the Landscape-Gardener.

IT has been said more than once in these pages that small gardening problems, as well as great ones, demand the artist's aid. Parks and city squares, cemeteries and large country-places must be laid out and planted by one who has studied design, and the effects and needs of trees, shrubs and flowers. This has long been acknowledged, and if we sometimes fail to act upon our knowledge, we do it with full consciousness of error. But small country-places and even villa-plots, if they are to be made the most of, must be entrusted, too, to competent hands. Whenever building, road-making and planting mean arrangement, they mean varied combinations of lines, masses and colors; this means the opportunity for a work of art. We certainly do not make the most of our surroundings if we miss this opportunity when it offers; and we are almost sure to miss it unless an artist tells us how to seize it. This fact also we are gradually, but surely, learning in America. Every prominent American landscape-gardener would affirm, if asked, that he has more work to do now than he had ten or fifteen years ago, and that the increase has come largely in the shape of problems which, ten or fifteen years ago, would have been thought too small and simple for professional treatment.

There is much that is encouraging in this evidence of increasing wisdom and good taste on the part of the public. But it is important that another necessity should be clearly understood, and that the client who feels the need for a landscape-gardener's services should understand just when they ought to be secured.

This time is at the very outset of his undertaking. As

soon as he thinks of building—as soon as he consults his architect, or even sooner—he should consult his landscape-gardener. Each artist is equally needed, whether the scheme be great or small, and the chief need is that they should work together from the very outset. The landscape-gardener should be the first to speak, though the architect may be the first to act, and within certain limits should throughout be allowed the controlling voice. It is for the advantage of both, and therefore doubly for the interest of the client, that such should be the case. When a landscape-gardener is called in after the house is finished, he too often finds that it is impossible to do the best that might have been done for the grounds. But he often finds, as well, that the best has not been done for the house itself. A building that is conspicuously placed is not of necessity well placed, although it often looks as though its designer had thought so. Only the trained landscape-gardener can tell what may be done to a spot to improve it as a building site. If he understands architecture as he should, he is at least as competent as an architect to say where, under existing conditions, a building will look best; and if he understands his own art, he is far better able to decide where it should be placed in order that the outside world will look well from windows—the most important of all considerations to its owners. Moreover, he alone can understand the suggestions of the site with regard to the laying out of approaches and the placing of minor buildings. His advice may be very helpful to the architect in deciding the question, What sort of an architectural design will best suit this locality? And when the locality has a very distinct expression, or when he desires to give it such an expression, then the architect is bound at least to consider his intentions. An architect ought to be willing to make great personal sacrifices if it can be proved that great benefit to beauty or convenience in the general result of his work and his fellow-artist's will result; but rarely will such sacrifices be required. Very often such slight modifications of the architect's wishes as even the stubbornest spirit would not object to making, may result in all the difference between a well laid out place, with convenient approaches and dependencies and beautiful views, and a botched place, the owners of which, if they have eyes to see, will be perpetually tormented by the thought of what might have been. Even a different arrangement of two or three windows, a different allotment of two or three rooms to their special purposes, may vastly increase the pleasure which the owner will take in his home; and when an architect is an artist, he will be quick to see the fact if another artist points it out, and quick to feel how his design can be adapted to a necessity which, unassisted, he might never have divined. Moreover, with regard to certain things of a purely architectural sort, the landscape-gardener should be allowed to speak in a very emphatic voice—if, we repeat, he understands architecture as he is bound by the canons of his own art to understand it. All architectural features which come in close contact with natural features—piazzas, terraces, external stairs, steps and seats, summer-houses, boat-houses, bridges, balustrades and boundary walls—should, whenever possible, be built with his assistance.

This, then, is the way a landscape-gardener's services should be sought. Send for him first of all, even though it is but a villa on an acre of ground that you mean to build; ask him where your house had better stand, where is the best place for the main entrance, the piazzas, the stable, the gates, the dog-house, even; if the grounds are larger, ask what architectural style seems to him most fitting, where on the plan the chief rooms should stand, what views their windows should command; then send for your architect, let them devise and decide together and work together till the work is done. If they are both of the right sort—and there are many of the right sort in our country to-day—they will not greatly disagree; or if they do at first, they will find a scheme of mutual compromise and eventual harmony; and you will run a far better chance of getting a good house and a good place than if they had worked separately—the architect building his house without knowing where it might best be placed or how best surrounded, and the landscape-gardener coming in afterwards to find, perhaps, that no chance was left him to assist the house or to do his own work well.

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The possession of a remarkable tree even in communities from which better things might be expected, has little influence upon its owner when a few dollars are placed in the balance against it. The *Salem Gazette* and other papers of Essex County, Massachusetts, have recently made an appeal for the life of a remarkable Walnut-tree which grew near the house of the late Ben Perley Poor, Indian Orchard Farm, near Newburyport. The tree, which was a very large one, with a trunk circumference of some twelve feet, was considered by Mr. Poor to be an English Walnut, but while the general habit and foliage were those of that species, the nuts were almost identical in appearance with those of the common Butternut, and suggested that it was a hybrid between the English Walnut and one of the American species. Such hybrids are not unknown, and there are two or three well-established instances of their existence in Europe. This tree was large, broad-branched and stately. For years it had been the pride of its owner, while its botanical peculiarities made it one of the most interesting trees in New England. The man who had nurtured it all his life was dead. It contained a few hundred feet of valuable lumber, and so, in spite of a general protest, it has been sent to the saw-mill.

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## Bamboos.

A VIEW of the entrance of the Botanic Garden at Peradenia, in the Island of Ceylon, appeared in one of the early numbers of the first volume of GARDEN AND FOREST. Among the most striking features of this garden are the clumps of giant Grasses which serve to illustrate the present issue. The one in which the base only of the stems appear is the great Bamboo of Penang (*Dendrocalamus giganteus*), of which the shoots, eight or nine inches through at the base, attain a height of a hundred feet. The second illustration represents a clump of the Java *Gigantochloa atter*, a plant hardly less stately than the last. Ernst Hackel, in his "Visit to Ceylon," thus describes the striking appearance of these plants: "If on entering the garden we turn to the left towards the river (the Mahavili) and follow its beautiful banks, we see from afar enormous green thickets of Bamboo, more than a hundred feet high, and as many wide, bending their mighty crowns like huge waving plumes of some giant's helmet over the river and the path, bestowing shade and coolness on both. As we go nearer we see that each of these bushes consists of several—often sixty to eighty—tall, cylindrical stems, each from one to two feet thick. They grow closely crowded together, like the creeping stems of a Rush." The rapidity of the growth of the stems is astonishing. They appear during the rainy season—that is, during the months of June and July—and are said to grow sometimes at the rate of a foot in every twenty-four hours.

The Bamboos, of which some 180 species, divided among eighteen genera, are now known, are widely and generally distributed through the tropics of both hemispheres. A single species (*Bambusa vulgaris*) is cosmopolitan, being found in both the old and new worlds, although General Munro, the author of the classical monograph of these plants, was uncertain if it was known anywhere in a truly wild state. Some genera are strictly American and others are found in the East only. Arundinaria, which furnishes the only Bamboo which grows spontaneously within the limits of the United States, is represented in both hemispheres, reaching to great elevations in the Himalayas, while a representative of an allied genus, Chusquea, first makes its appearance at an elevation of 13,000 feet in the Andes, and 2,000 feet higher

completely covers the surface with thickets impenetrable to man or beast.

The berry-bearing Bamboos, of which there are eight genera, are all found in the East; three of the species are found in Madagascar, one (*Schizostachyum parvifolium*) is described by Ellis in his account of that island, as "an elegant, slender creeper, with a stem scarcely as thick as a quill, growing nine to ten feet long, and hanging in most elegant festoons from tree to tree alongside of the roads."

No native Bamboo occurs in Europe, while from the whole of the vast continent of Africa only one native species is known. Bamboos are found widely distributed through southern China, in Japan, the Philippine and Fiji Islands, and one species occurs in the Sandwich Island group. The largest of the whole tribe, *Bambusa Brandisi*, a native of the hill districts of India, attains a height of 120 feet, with stems nine inches in diameter.

No group of plants, not even the Palms, is more useful to man than the Bamboos. They supply food and raiment and shelter to millions of people. The young shoots and the seeds furnish food to man, and the leaves fodder for domestic animals. The stems are used for building purposes and the leaves for mats and cordage; paper is made from the leaves, and furniture and almost everything else, where wood can be used, from the stems. The whole industrial fabric of the East is dependent upon these great Grasses, and it is impossible to think of a Chinaman or a Malay, without associating with him, in some form or another, the Bamboo.

The arborescent species have long been familiar ornaments in all tropical gardens; and, as our illustrations show, no plants of the north possess their stately grace and beauty. A good deal of attention has been paid in late years to the cultivation of some of the smaller species, of which several have proved hardy in the more temperate parts of Europe. Some of these are highly valued as ornamental plants, and their general introduction and cultivation in the gardens of southern Europe is one of the interesting events of modern horticultural progress. These dwarf Bamboos are not yet very well known in this country, although the climate of the Southern States is admirably suited to them, and there are several species which can be grown in California, with the aid of irrigation. There is at least one species, although unfortunately of dwarf and not very attractive habit, which is hardy in New England, *Arundinaria Japonica* (the *Bambusa Metake* of most gardens), and there are probably six or eight more, natives of Japan, China and the Himalayas, which can be grown in the more temperate parts of this country. None of them have stems which exceed, under the most favorable conditions, a height of twenty feet, so that while they may serve to add grace and charm to any garden, and to recall the vegetation of the tropics, they can give but a very faint idea of the veritable giants of the race, which can be seen in all the splendor of their beauty in the tropics themselves only.

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## Notes from a South Carolina Naturalist.—II.

AT Sandy Run I find *Euonymus Americanus*, the bursting capsules gladdening the heart, and here, also, I see a few of the prickly follicles of *Gonolobus hirsutus*. Formerly there were many vines here, all growing together, but bearing flowers of different colors, yet they were all *G. hirsutus*. Some of the flowers were palish yellow or straw color, others brownish purple and some almost black. One vine had paler flowers, somewhat approaching lilac. The petals in all were veined, the straw color showing it best. *G. suberosus*, Gray (*G. macrophyllus*, Chap.), with its smooth and angled fruit, is found some miles off. The road runs through deep sand, still following the river westward, with Corn and Cotton on each side. We pass Linden, see the large Magnolia, so prized by the ancient owner, and think of the days that are no more! Next, Gascoigne's Bluff on the one side and Middleton swamp on the other, on whose knolls of Beech and Magnolia and Hickory the wood-cutter is now cutting down the finest trees of Walter's Pine (*Pinus glabra*), so long ignored, till rediscovered by Dr. Ravenel—now, alas! lost to us; lost to the science he loved! In the surrounding Pine-land I have seen only one or two trees of this Pine, but deep in the recesses of the swamp it is abundant enough to be cut and floated to the mill, which, like a devouring monster, is taking the choicest treasures of our woods. Certainly a beautiful Pine, with its peculiar bark, its smooth limbs, its soft looking foliage. The wood-cutter told me that he had cut trees there thirty inches in diameter. I have often wondered that this tree had been so long ignored, or that it was not cultivated as an ornamental shade tree. So far as I know, it makes no forests of its own, but is found only sparsely among other trees, yet very lately it is said to have been found in great abundance in Wassamassaw Swamp, not far from Charlestown, the trees there being of great size and beauty, tall, stately, columnar. As to its locality, it is never found, I believe, very far from salt water. I find it on the banks of the Edisto, in the swamps near Jacksonboro' station on the railroad, in the swamps bordering the Savannah River rice fields, in the driest soil not far from the Colleton River, and on Hilton Head, along the bluffs of Calebogue Sound, between "Spanish Wells" and the ocean. It will grow, therefore, in most soils, both dry and wet, in the low country, save some Pine-lands. It is doubtful whether it would grow at the north, but it is worth the trial.

In many trees I have observed that the small branches grow out horizontally from the larger limbs, making the foliage appear dense and flattened, even though the smaller branchlets be really erect. The spray, therefore, often looks flattened, and it has always seemed to me a striking peculiarity. On James Island, near Charlestown, there were formerly many large trees, but the finest, which, it is said, were ninety or even a hundred feet high, were killed by the great cyclone of 1885. At "Burch's," on the same island, there are others left (so a friend writes me) which are about eighty feet high, tall and straight, having no branches for sixty feet from the ground.

As we continue, a few trees of the Swamp Chestnut Oak (*Quercus Michauxii*) are seen with Beech, and Magnolia and Maple, but the only Pine is Loblolly (*P. Tæda*), which indeed is everywhere. At a roadside bridge, as we approach "Rose Dhue," vines of *Forsteronia difformis* are growing, the bloom, of course, long over, but I look in vain—as I had looked for years—for the long follicles. The road is now overarched with a dense growth of Cedar (*Juniperus Virginiana*) on one side and Live Oak on the other, making a dark and shady avenue, which carries us at last to the salt-water bridge, where, in the hottest days of summer, a sweet, cool draught comes to us across the marshes from "Rephaim." As we cross the next bridge a sad sight meets us in the utter destruction of a field of sea-island cotton by the caterpillar. Close to the marsh a few acres of brackish myrtle land had been cleared by the industry of negroes, and when last I saw it there was the promise of a most abundant crop, but what a scene of blackness and desolation met us! The tall stalks were all stripped bare of leaves, with only the black and shriveled pods remaining. Only a few of these were bursting here and there with the "snow of Southern summers." We were glad to pass on till we reach the deep swamp at the foot of a white and sandy hill, as we of the low country call so slight an elevation. Here is the usual swamp growth of Nyssa, Maple, one or two small Cypresses, and a single high-climbing vine of Decumaria; but the tree which will most attract our attention will be the (to us) rare *Pinckneya pubens*. We see the greenish and pale yellow capsules in thick clusters among the mellowing leaves, but they will soon be ruddy-tinged when the later frosts come. This spot is, so far as I know, its farthest northern limit, and I have seen it in only one other place not far off, and a single small shrub near the Savannah River. It is a shrub-like tree, but it reaches a height of twenty-five feet, and a section of one such I sent, some years ago, to Professor Sargent for the Jesup collection. The flowers in June, with their beautiful peach or rose-bloom floral envelope, are very showy. The young trees sometimes have the floral envelope almost white, with but a tinge of pale pink, but those of the old trees are usually most deeply colored, and are very beautiful.

The edges of this swamp in June, all ablaze with the rose-pink bloom, is a sight worth seeing, and at such a time I wonder the more that it has never been cultivated. As it seems most likely that this was the tree which Bartram found growing with his now long-lost *Gordonia pubescens* (*Franklinia Altamaha*), I thought it barely possible that I

might stumble upon it here. My explorations have never rewarded me with its rediscovery, but it may doubtless yet be found in the Fort Barrington region, where Bartram first saw it in 1773. We take our last draught of water from the cool spring, mount the sandy hill, and for some distance see only trees of *Pinus palustris*, and of Oaks—*Q. cinerea* and *Q. Catesbæi*—fit soil for them all! Passing through a wet "gall," I look for Elliott's *Solidago elliptica?* which I met with at this spot a few years ago, but I failed to see it; yet I have since found it not far from the Okeetee, where, also (but in clay land near the bridge), I was fortunate enough to collect, for Dr. Gray, fine specimens of the equally rare *Actinomeris alba*. We toil on laboriously through Scrub Oaks and Pines, and, before we leave the sand, look for *Asimina parviflora* (which grows abundantly in an old field near by), but no plants were to be seen on the roadside.

At last we reach the cane-brakes of the "Great Swamp," and, by the new growth of Pine met with, know that clay soil has been reached. It is the rough "Spruce Pine," to distinguish it from Walter's smooth Spruce (*P. glabra*). I refer to *P. mitis*. I have but rarely met with the three leaves in a sheath. *P. Tæda* is here, also—for it is everywhere. *Collinsonia punctata* was once most abundant in the woodlands about, but it seems to be disappearing, and a little further on I see but a single specimen of *C. scabriuscula*. The last seems very rare. We pass the old Garvey gate, with its few Cypresses, and are cheered by the autumn colors of Golden-rod—seemingly *Solidago tortifolia*—covering whole fields. The faint glow of coming winter is already in the trees about the river, chiefly Nyssa and Maple, and now the distant rice-fields are seen. We cross the bridge at New River, and see the signs of the late disastrous freshet which had burst over the railroad, overleaping dams and submerging the harvest-fields of rice, and had carried destruction with it, thus mingling the red waters of the Savannah with the purer tide of New River! The marks were on every side in the bending and prostrate plants and sheaves of golden grain, still lodged high and dry on the shrubs and tall grasses.

It was the highest, and, I believe, the most destructive freshet ever known in the rice-field country hereabouts, and will never be forgotten either by planters or negroes. On the middle bridge of the Causeway I looked for the remains of *Eryngium prœaltum*, where I collected specimens in the summer, but I saw none, and but one tall specimen some six or seven feet high (of what I took to be *Eupatorium serotinum*), was left green and flowering, of the many formerly seen.

Turning, now, sharply to the right, I look down the Screven's Ferry road to the left, and recall, with the same glow of pleasure, my great "find" last summer of the (to me) most rare *Anantherix connivens*. This was but the third plant I had ever seen—the second having been collected many years ago, some fifteen miles away in a damp Pine-land, and sent to Dr. Gray. That plant was about eighteen inches high, if I remember aright—this four feet three inches. We wade through long slashes of water on the edges of swamps with *Quercus Phellos* abounding. Emerging from these glooms, we come to red clay, which soon runs off into a drier and more gravelly soil, and here I was glad to see several acres of the young saplings of *Pinus palustris*, to the exclusion of all other Pines. As we go on through damper soil we see the long, slender plumes of *Liatris graminifolia*, with here and there the *L. gracilis* of Elliott. *Liatris odoratissima* is also here, but its bloom is long since over. *L. paniculata* we left behind long ago, with also *L. scariosa* in the dry woodlands, but the show of the fall is poor in comparison with former years. Visiting the house of a negro patient, and seeing a splendid Hibiscus in full bloom, I hoped that by a mere chance it was the long-lost *H. Carolinianus* of Elliott, but a closer examination proved it to be only the *H. grandiflorus* of Michaux. It was brought from Georgia, but it grows also in South Carolina, for I once saw several acres of it in black and brackish soil just back of the sand hills on Hilton Head. Few sights more beautiful could be imagined. Again we meet with *Pinus Cubensis* abundantly, and at last reach the railroad, where my journey ends and my work begins.

Bluffton, S. C. *J. H. Mellichamp.*

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"Meantime, there is one duty obvious to us all: it is that we should set ourselves each one of us to doing our best to guard the natural beauty of the earth: we ought to look upon it as a crime, an injury to our fellows, only excusable because of ignorance, to mar that natural beauty which is the property of all men."

—*Morris' Lectures on Art.*

# Cultural Department.

## Selaginellas.

ACCORDING to the latest monograph of these plants, there are no less than 334 species now known. For horticultural purposes many of them are either wanting in beauty and interest, or are too much like other species to be worth growing. The collection of species and varieties of Selaginella cultivated at Kew is the largest I have seen, comprising, as it does, ninety-two species and varieties. Most of these are grown in a portion of the large house devoted to tropical Ferns, the Selaginellas occupying a side stage on the north-west side. Each kind is represented by several large panfuls, the pans being from one and a half to two feet square and about six inches deep. The effect of these plants, when grouped as at Kew, is exceptionally handsome, and they are looked upon as one of the most interesting and attractive features of the house collections. They are easily managed—in fact, no plants more easily; they grow quickly into perfect specimens, and they may be propagated to almost any extent in a short time. Many of them are of dimensions large enough to be grown as big specimen plants, others make pretty basket plants, while the smaller creeping kinds may be employed for many purposes, such as forming a carpet under large plants either when grown in pots or planted out. But to enjoy these plants to the full they should have a house or portion of a house to themselves. There is variety enough among them to please any one. Next to the filmy Ferns, I consider the Selaginellas the most delicately beautiful of all the Vascular Cryptogams.

The following list of twelve good kinds, for the stove or warm green-house, comprises representatives of all the most attractive types or groups. They are the pick of the Kew collection, and they have the merit of keeping well through the winter. Probably, however, delicate plants such as these do not suffer so much in America in winter as they do here.

The soil used is a mixture of loam and leaf-mould, with a good sprinkling of silver sand. It should not be pressed hard into the pans or pots, but about as firm as for Verbenas, etc. The drainage should be carefully prepared, so that the water daily required by these plants all through the summer will not have any difficulty in passing away. The temperature of the house where they are grown at Kew does not fall below 60° Fahrenheit in winter, and 70° Fahrenheit in summer. About the end of February cuttings of all the kinds should be put into pans or boxes, so that any specimens which are too shabby to be worth keeping another year may be replaced. Such species as *S. Mertensii*, *S. denticulata*, etc., are omitted from the list, as they are already universally grown, the object here being to call attention to the many beautiful kinds of Selaginellas which are in cultivation in a few gardens, such as Kew, but which are almost unknown in general horticulture.

*S. affinis*, a recent introduction from British Guiana. It has stems nearly a foot high, with the habit of a dense variety of *S. Mertensii*, and scale-like leaves, crisp, imbricated, rather firm and bright green. The branches are tasseled and curved back. This is a beautiful plant, as delicate and soft-looking as a *Todea pellucida*.

*S. atroviridis*, a fairly well-known plant, a native of India, China, etc. It is remarkable for the shining dark olive-green of its broad fronds. In tropical countries its leaves are almost black. The stems are about nine inches high, freely branched, the leaves being very broad and flat in their arrangement. This is as easy to grow as *S. Mertensii*.

*S. caulescens*, var. *argentea*. The lower part of the stem of this kind is unbranched, while the upper half is bent horizontally and covered with lance-shaped, overlapping branches, so that the whole stem has the appearance of a large deltoid frond with a long stalk. The branched portion is a foot long by about eight inches broad, beautifully clothed with small bright green leaves arranged almost flat; the tips of the upper branches are whitish. This grows freely, and is the handsomest of all the varieties of *S. caulescens*. It is a native of the Malay Peninsula.

*S. Emeliana*, a semi-erect kind, nine inches high, the fronds like those of *S. Mertensii*, but much more delicately divided and triangular in outline, while the leaves are smaller and inclined to curl. The color is a soft, deep green. It was introduced by B. S. Williams, of Holloway, in 1886.

*S. grandis*, the handsomest of all cultivated Selaginellas. It grows to a height of two feet, the stems erect and unbranched, except on the upper six inches, where the branches are numerous, arranged side by side so as to form a flat, shell-like frond, of the brightest and clearest blue-green. Each

branch is terminated by a square, tassel-like spike one and a half inches long. It was introduced in 1882 from Borneo.

*S. hæmatodes*, a large-fronded, beautiful plant, which will grow into very fine exhibition specimens. Nothing could be more delicate and pleasing than the arrangement of the branches and leaves of this species. The stems are from one to two feet long, bright crimson, unbranched in the lower half, the upper half horizontal, and branching freely, so as to form a large frond a foot across, and as delicate in its details as a *Todea superba*. There are several varieties, all of them beautiful. It is a native of Peru.

*S. inequalifolia*, an erect grower, two feet high, with the main branches arranged alternately at regular intervals from the base to the top of the stem, the branchlets forming flat, deep-green fronds five inches long and four inches across the base. It forms a very distinct and handsome specimen when grown in a mass. It is a native of India.

*S. stenophylla*, var. *albospica*, a graceful plant of medium size, with erect stems, freely branched, somewhat like *S. Mertensii*, but much more delicately divided. It is one of the prettiest for growing in masses in large pans. The branches are sometimes tipped with yellow. It is a native of Mexico.

*S. suberosa*, similar to the last, but deeper green, and the stems are brown, those of *S. stenophylla* being pale straw-colored.

*S. uncinata* (*S. cæsia*), a pretty little trailer, with alternate branches, somewhat triangular in shape, about three inches long, and covered with tiny leaves of a steel-blue color. This color varies in intensity at different times of the day, sometimes being almost pure green, at others an intense shining steel-blue. It is a useful plant for growing amongst Orchid-pots, and like situations. It comes from China, and is often met with in cultivation in England.

*S. Wallichii*, an arboreal kind, attaining a height of three feet or more. The stems are upright, clothed with horizontal branches, each of which is a triangular frond nine inches long by three inches at the base, plumose, and bearing small, rigid spikes from the tip of every branchlet. This is a very handsome species, which may soon be grown into a large specimen, if properly staked and trained. It is a native of India and neighboring countries.

*S. Willdenovii* (*cæsia arborea*), a remarkable plant, the stems climbing to a length of twenty feet or more, as thick as a goose-quill, and bearing at intervals of about six inches frond-like branches, each two feet long, triangular in outline, and covered with the small scab-like leaves, which are shining blue-green. There is a mass of this species in the Fernery at Kew eight feet through and ten feet high, forming a most beautiful specimen. It is a native of India.

Many more species, quite as handsome as those described, might be added, but these dozen kinds will give a very good idea of what the rest are like.

Kew, December, 1888. *W. Watson.*

## Winter Apples of New England.

UNQUESTIONABLY the Baldwin is the leading market apple grown in southern New England, and westward, along the same parallel, to western New York and Michigan. The Rhode Island Greening makes a close second; while, as a long keeper, the Roxbury Russet has no rival among the commercial sorts. In the business sense these are favorite apples, and a well-grown, yellow-fleshed Rhode Island Greening is worthy to rank with our really best apples in quality, for dessert, as well as for the kitchen. And here it may be well to say, that it is a mistake to speak slightingly, as some do, of cooking apples. Much the larger part of our great apple-crop comes at last to pies, dumplings and apple sauce. Equally is it wrong to suppose that an apple poor in quality is good enough for cooking. We often hear the Esopus Spitzenburg referred to as the *ne plus ultra*, in quality, of American apples. It is all that, as a cooking apple—preserving its high, aromatic flavor through the trial of fire; but I never could consider it as a dessert apple. Its flesh is too solid for that.

The Baldwin, well grown and well ripened, is a fair dessert apple. We could get along with it, if we had no better. But we have. Among the big red apples, Northern Spy is much its superior. The Red Russet is an apple superior to the Baldwin in quality, keeping and vigor of tree, and its equal in size and productiveness It is supposed (by Cole) to be a cross between the Baldwin and the Roxbury Russet, but no reason is given for the supposition. It had its origin on the Sanborn farm at Hampton Falls, New Hampshire. In Maine it thrives so well, that in all but a few localities it seems to be supplanting the Baldwin. Though not an "iron-clad," its northward range is beyond the Baldwin's, perhaps coincident with Jewett's Red, or Northern Spy. It is worthy of much more attention than it has yet had from commercial growers.

Another very valuable winter apple of Massachusetts origin is Sutton Beauty. It is not so good a keeper as the Baldwin, and though often called a large apple, it requires good soil and treatment to do justice to itself in this particular. As usually seen, it is not so large as the Baldwin. Its color is crimson red on a waxen yellow ground. It is a crisp, juicy apple, with a sprightly, pleasant, acid flavor. Though highly prized in Massachusetts, the fame of the Baldwin overshadows it and keeps it in the background.

Yellow Bellflower is an apple hard to surpass when in perfection, and prime fruit of this variety always fetches a high price in Boston. But it is very particular in its choice of locality. I have never seen first-class Bellflowers grown anywhere except upon the banks of, or near to, some large river, like the Connecticut, or the Kennebec. When suited in location, no Apple yields better or finer fruit. Maine-grown Bellflowers keep as well as Baldwins, though it is reckoned an early winter sort. Although called a yellow apple, choice river-bank fruit always has a fine pink cheek, which is not only an additional beauty, but a seal of excellence.

It is a curious fact that so great an apple-growing state as Maine should not yet have produced a first rate market apple, that is also a long keeper. Black Oxford, perhaps the best keeper among the well known Maine apples, is but a third rate fruit in quality. New Hampshire has her Red Russet; Connecticut her Westfield and her McLellan; Rhode Island her Greening; and Vermont her Landon; but Maine is yet in arrears to the country on this point.

The Westfield Seek-no-Further of Connecticut is a market and dessert apple of a high grade, successful over a broad extent of country. It is grown westward to Michigan, and the finest specimens of the variety that I have seen on exhibition have been from that state. It is an apple very even in size, a thing important in barrel-fruit. The peculiar Pearmain flavor, noted by Downing, makes the Westfield very popular with old-fashioned people. The McLellan, somewhat less in size than the Westfield, is not inferior in quality. A yellow apple, marbled and splashed with clear red, its white under flesh juicy, and with a saccharo-vinous flavor, rare to find, makes it a choice apple indeed. The tree is vigorous, productive, and hardy nearly up to 45°, though, unfortunately, not "iron-clad." Peck's Pleasant must not be forgotten among Connecticut's choice apples; indeed there are many who would name it first. Large, round, fair, greenish yellow, with a sunny blush, as rich in flavor as Newtown Pippin, with a softer flesh, it must long remain among New England's best apples. It is a fair, but not very long, keeper.

Vermont's Landon has not received the notice among pomologists which its merit deserves, possibly because it is not a large apple—merely medium. Round, slightly conical, yellow, mottled and shaded with rich crimson, with a little russet around the stem, it is handsome enough, as it is good enough, to be better known. Flesh yellowish, firm, crisp, juicy and aromatic, and but slightly acid, this is a choice apple indeed. Origin, the Landon farm, on Grand Isle, Lake Champlain. Season, February to May. The one apple, which space now allows me to notice, and which should not be omitted, is Hunt's Russet, sometimes called "The Golden Russet of Massachusetts." If there is a best apple, surely we have it here. (Downing has it under both names, seemingly unaware of the fact.) It originated in Concord, the home of patriotism, poetry and philosophy. Not a large fruit, rather small indeed, it illustrates the saying that the best things are put up in smallest packages. It is thinly russeted on a yellow ground, with a bright, rich red cheek; with a fine-grained, yellowish flesh; with a tender, juicy, very rich, aromatic, and briskly (but not excessively) acid taste, and altogether, Hunt's Russet is an apple to offer to our most highly valued friends, in our most friendly mood.

Newport, Vt. *T. H. Hoskins.*

## About Sea Kale.

WHERE the plants are obtained from seed this is sown in early spring, either in the open ground, in hot-beds, or green-houses. If the seed is sown in the open ground in drills, these should be two feet apart, and the seed should be dropped thinly, so that the plants stand twelve inches apart in the row. Under good cultivation the plants may become strong enough to force the first year, but it often happens that they do not get sufficiently large until the second year, when the seed is sown in the open ground.

When the seed is sown in the green-house or hot-bed during

February or early in March, and well cared for, nine-tenths of the plants will be strong enough to force the same season.

My treatment of the crop the past year was this: As soon as the seed was received, about the tenth of February, a boy was set to crack the capsules which contain it. The seed was sowed in drills between rows of Smilax, in a temperature of about fifty-five degrees. The plants appeared quickly, and as soon as the two seed leaves were developed and the third leaf could be seen, they were potted into two-inch pots and placed close to the glass, in about the same temperature. They were kept well watered, and often moved to prevent their rooting in the soil beneath the pots, until the end of May, when they were planted in the open ground, fifteen inches apart in the rows, which were three feet apart. After this they received exactly the same attention as did other members of the Cabbage family.

On the 7th of November the roots were dug and stored, many of the largest ones being two inches in diameter, and the smallest three-fourths of an inch in diameter, although there were few of the last size.

They were stripped of their leaves and buried in sand out-of-doors, so that they could be reached from time to time during the winter.

The first lot for forcing was brought in the last day of November, and planted in rows eight inches apart, each way, in ordinary soil. The temperature was kept at fifty-five to sixty degrees. The house was kept as dark as tight boards all around and over head could make it. Water was given twice a week, and the crop was ready to cut on Christmas. In appearance it was like very fair, perfectly blanched celery. A succession of crops is now following, and as the season advances, two weeks, instead of three, will be long enough for forcing a crop.

It is surprising that Sea Kale is so rarely grown in this country, since it is a delightful dish when properly cooked and served. It should never be used when in the least wilted or flabby. When not perfectly crisp it should be immersed entirely in water for six or seven hours before it is plunged in the boiling water. This water should contain enough salt to give it a distinct flavor, and a lump of soda as large as a hickory nut will improve the appearance and flavor of the vegetable.

Pearl River, N. Y. *John Thorpe.*

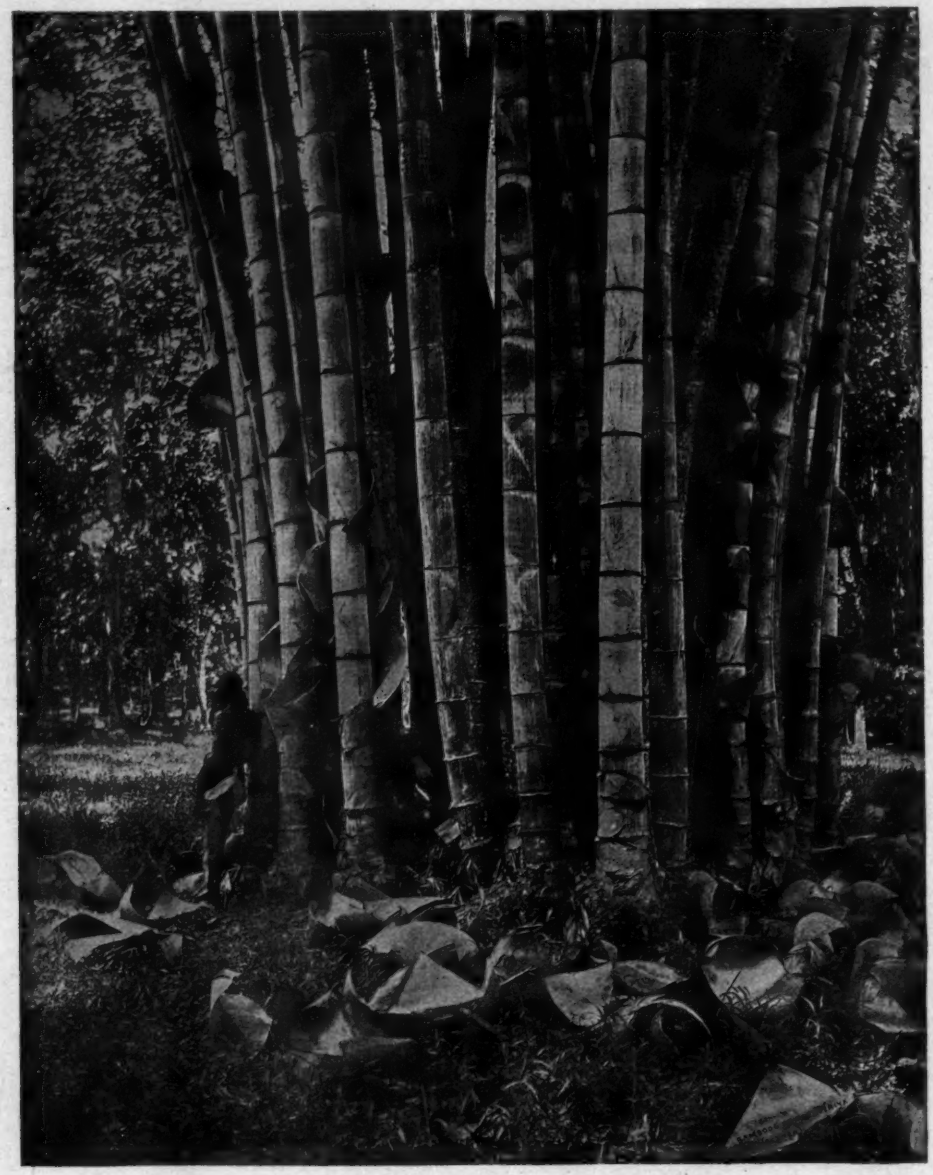

Fig. 85.—Giant Bamboo (*Dendrocalamus giganteus*) in the Botanic Garden, Ceylon.—See page 14.

## Orchid Notes.

*Zygopetalum Mackayii.*—Several plants of this old and well-known Orchid are now in full beauty here, and the bold spikes of bloom form quite a prominent feature of the collection at this season. The value of the flowers is enhanced by their lasting quality, both on the plant and after having been cut. This species will be found exceedingly useful to florists for cutting. It can be grown easily and will accommodate itself to almost any house, thriving well among foliage plants, Roses, or in the coolest plant-house. The flowers appear at different periods, according to the temperature given them. A strong compost of fibrous loam, kept open with nodules of charcoal, seems to suit the thick, fleshy roots, and during active growth it needs a plentiful supply of water, and if in good condition is benefited by frequent waterings of weak, liquid manure. The spikes appear from the young growths, which, if strong, will produce two, each bearing from eight to twelve of its large, handsome flowers. The sepals and petals are yellowish-green blotched with purplish-brown. The large, spreading lip is pure white striped with blue. There are several varieties, differing chiefly in color. It is a native of Brazil.

*Odontoglossum Dormanianum.*—This rare and pretty little Orchid is now in flower. In habit it bears some resemblance to *O. blandum*, and is probably only a geographical form of it. The flowers, borne on drooping racemes, are about two inches across, and are pure white densely spotted with mauve-purple, excepting the tips of the segments. It is a robust grower, and requires the treatment usually given to the genus.

*Odontoglossum ramosissimum* is a rare species producing branching scapes with numerous, wavy, speckled flowers which, in a mass, are particularly attractive. The bulbs are

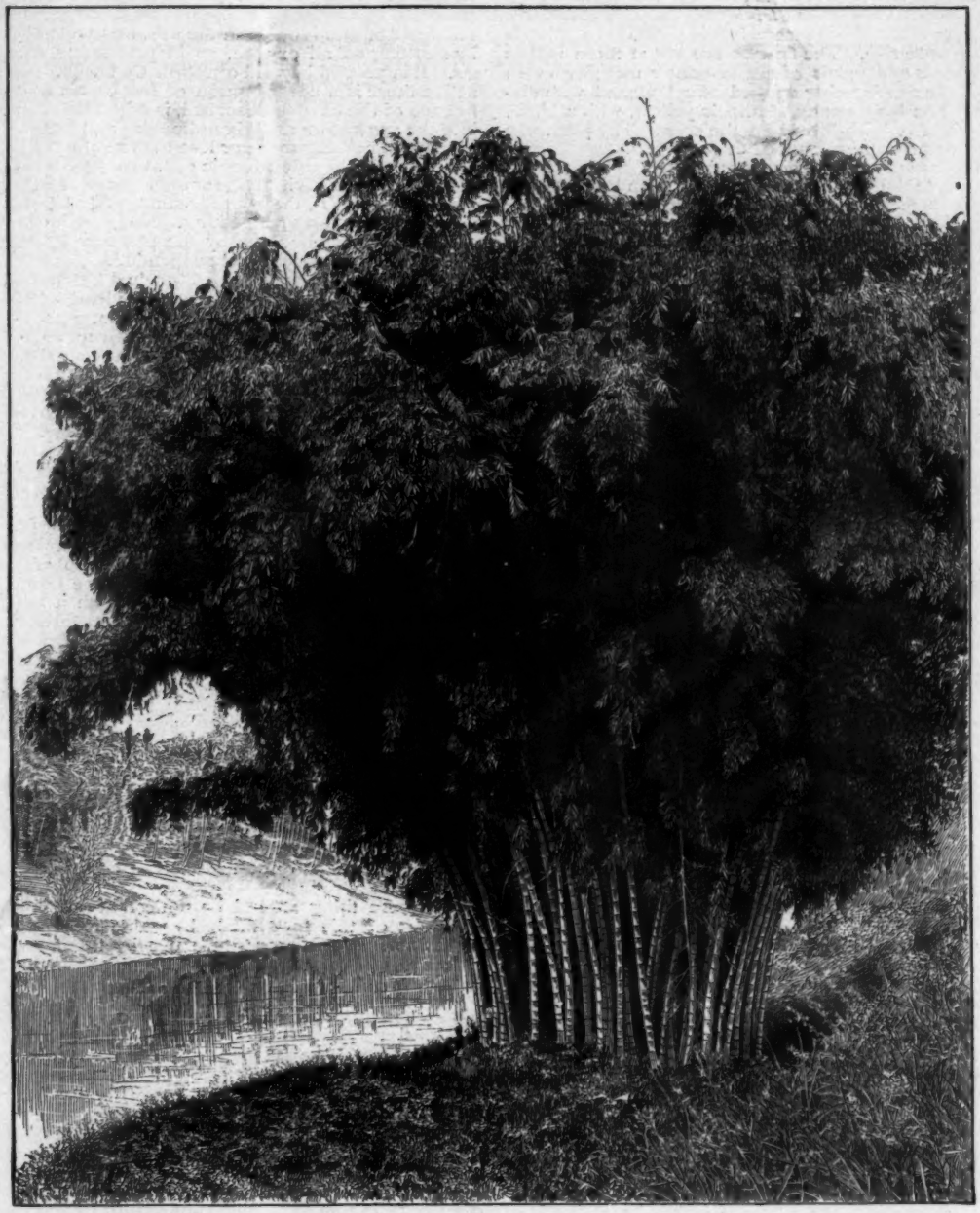

Fig. 86.—Giant Bamboo *(Gigantochlon atter)* in the Botanic Garden, Ceylon.—See page 14.

large, compressed and ovate, surmounted by a linear-lanceolate leathery leaf about a foot long. The flowers are about two inches across, wavy in outline, white speckled with rose-purple. This plant is found in dense forests on the central Corderillas at elevations of 6,500 to 1,300 feet; consequently it wild stand very cool treatment, but does best with an average temperature of 55°.

*Odontoglossum Shuttleworthæ.*—This is a superb species, and the specimen in flower here is unique. It is presumed to be a natural hybrid between *O. triumphans* and *O. Pescatorei.* The habit and inflorescence resemble the latter, but the bulbs attain an immense size. The flowers are about three inches across, the sepals and petals of a straw-color margined with deep yellow, the sepals being spotted and blotched with cinnamon red. The large pandurate lip is yellow, with a large, broken blotch of reddish-brown on the crest. The plant was imported among a consignment of *O. Pescatorei.*

*Oncidium excavatum* is a very strong, free-growing kind, with large, ovate bulbs, and broad, deep-green leaves about twelve inches long. The strong, branching scapes are three to four feet long, and bear numerous showy flowers about two inches across. The sepals and petals are bright yellow blotched with brown. The lip is large, flat and of a deep golden color. The crest, which is very prominent, is yellow marbled with brown. This is a particularly showy species, producing its flower-spikes freely, and it would also be extremely useful to florists for cut-flower purposes. It is a native of Peru, and grows freely in a cool, damp atmosphere with the Odontoglossums, but should be accorded a good rest as soon as growth is finished, or new growths will appear instead of flowers.

Kenwood, N. Y. *F. Goldring.*

## Principles of Physiological Botany as applied to Horticulture and Forestry.

II.—THE CONTENTS OF VEGETABLE CELLS; PROTOPLASM, OR LIVING MATTER; THE VARIOUS LIVING GRANULES, OR PLASTIDS; RELATIONS OF THESE TO THEIR SURROUNDINGS.

STARTING from the point reached in the first paper of this series, we recognize these facts (1), that all plants are composed of minute bodies, termed cells, and of the products formed by them; (2), that these cells, while living, contain active living matter, or protoplasm, in which and by which all the proper work of the plant is carried on, and (3) that this living matter, or protoplasm, in one cell, is practically continuous with that in adjoining cells, and so on throughout the whole plant.

The properties of protoplasm must now engage our attention, since we cannot understand in what way all these cells work harmoniously together and accomplish certain results, unless we first ascertain the teachings of modern science regarding their active contents.

It should be stated frankly at the outset, that it is a hard matter for one who is not engaged directly in the study of plants to get a clear notion of this part of the subject. A tree appears so strong in its framework, and we have seen it resist so many gales of summer and storms of winter, that, as we have said before, we can hardly realize that the stout framework is not alive, but is merely the mechanical support of a film, or succession of films, of extremely delicate cells which lie just under the protecting coats of the inner bark. And it is still more difficult to realize that it is to the living matter of these cells that we must look for every sound explanation of the phenomena of plant life. Our present course of thought must lie, therefore, for a time among the things which are unseen except by aid of high powers of the best microscopes. In fact, one or two of the more recent acquisitions in this field have been possible only because of important advances made of late years in the construction of microscope lenses.

PROTOPLASM, OR THE LIVING MATTER OF THE CELL.—This is essentially the same in animals that it is in plants, and presents about the same phenomena. Under the microscope it appears as a colorless, somewhat granular, half-liquid mass, which in certain thin-walled cells, which it does not quite fill, can be observed to change its shape more or less rapidly. These movements of protoplasm can be readily made out in such thin-walled cells as the hairs of the Squash-vine and Nettle, and in innumerable other instances may serve as a good criterion of its activity. For the examination of such phenomena it is not necessary to use a very high power of the microscope, two or three hundred diameters being sufficient. These movements are hastened by increasing the warmth of the cell up to a certain temperature, say about one hundred Fahrenheit; but when we reach a temperature forty or fifty degrees higher than this, all motion stops and does not begin again. If, on the other hand, we cool the cell down, the motion can be retarded until, a little above the freezing point of water, it is arrested, but on warming the cell again, very cautiously, the movement is resumed.

There are many ways in which the movement can be arrested—as, for instance, by strong electrical shock, or by crushing, and so on; but the only ones which need to be particularly noticed now are the following: (1) by shutting off all water and food from the cell, as in starvation, and (2) by shutting off all oxygen, as in preventing free access of air. It is proved beyond question that when protoplasm is active there is a consumption of food, which, under the influence of the oxygen absorbed, is converted sooner or later into the gas known as carbon-dioxide* and water. The latter process is nothing more or less than respiration, so that we have here in the microscopic cell, two processes which are essential to all activity in the animal as well as in the vegetable world, namely (1), the appropriation and utilization of food, and (2) respiration or breathing. No growth can take place and no work can be done by the plant or by the animal if either of these processes is suspended.

But just here appears a world-wide difference between the plant and the animal. The plant, by virtue of certain granules which its protoplasm contains, can, under certain circumstances to be described later, construct its own food out of inorganic matters obtainable from the air and from water in the soil, whereas no animal can do this. (We are leaving out of account, as was explained in the introduction, some interesting exceptions, which will be found explained in all large works on the subject, for our purpose is merely to show what are the general cases and comprehensive rules.)

We must now look at the granules by which plants can effect this extraordinary change of inorganic into organic matter.

The cells in the green parts of plants contain, imbedded in their protoplasm, minute greenish granules of various shapes, generally roundish. These are known as the chlorophyll-granules, or, what means the same thing, leaf-green granules. When these are provided with a supply of carbon-dioxide in proper amount, and are exposed to sunlight, they can, if all the other conditions as to warmth and so on are favorable, manufacture a sort of sugar, or something very much like it, giving off at the same time a certain proportion of the oxygen which was in the carbon-dioxide. This sugar, or its equivalent, is the primary food of the plant. This process, which appears to be so simple, is in reality very complex, and can be only partially understood even after we have examined the structure of the parts where most of the green granules are found in our plants, that is, in the leaves. It is enough for the present to state that this wonderful laboratory of a green cell constructs all the food for animals, as well as for plants, since it is the excess of what plants make and do not themselves consume that animals employ as their food.

One more thing should be noticed at this point, namely, that part of this food made by plants is stored up in the form of starch or oil for future use by them, while a large part is turned to account in building up, in the form of cellulose, or cell-wall substance, the fabric of the plant.

We must next combine a few of the foregoing statements, in order that the relations of the cells to each other may become plain. The cells which contain the leaf-green granules require for the manufacture of sugar (1) water, which comes in by absorption from the immediate surroundings; (2) carbonic acid, procurable from the air; (3) light of a certain quality and intensity; (4) a certain temperature. Now, the green cells of our trees are mainly in the leaves. The position of the foliage exposes them sufficiently to light and air, while communication with the soil is effected through the stem and roots. In other words, millions of cells in the roots and elsewhere in the plant are tributary to these green cells of the transient foliage.

Our task is now fairly before us. We are to see in what way this co-operation between the cells in the roots and leaves is accomplished, and to what extent the roots, stem and leaves share in all the varied work of the plant. Reserving the examination of these organs to later papers, we may give a passing glance at certain curious relations which have been recently discovered by Professor Schimper, between the leaf-green granules and other granules within the cells of plants. In the cells at the growing points of plants

*Carbon-dioxide is often termed carbonic acid, and these terms may be used interchangeably.

there are discernible, under high powers of the microscope, minute granules which, without special chemical treatment, easily elude observation.

When the cells at the growing points develop into the leaves and into parts of the flower, changes take place in these granules, or plastids, as they are called. Some remain with hardly any change in the cells where starch and other substances are to be stored, and here they take on the work of gathering up the provision for future use. Others become the leaf-green granules, and have for their office the manufacture of food, while still others and their products are made to play the chief part in coloring our fruits and flowers. As we have seen that from modifications of the simple cell all the different parts of the plant are derived, so from modifications of the simplest plastids at the points where the cells arise, are formed the other plastids, or granules, in which the myriad activities of the plant are manifested.

There is still one other body to be referred to as existing in the protoplasm of the cell, namely, the nucleus, a somewhat denser part, which passes through a succession of remarkable changes when new cells are produced. The consideration of these changes must be deferred until, after having examined the roots, stems and leaves of the plant, we can properly approach the subject of growth. Our first work is to apply these general statements regarding the cell to an examination of the organs which the cells compose.

Cambridge, Mass. *George Lincoln Goodale.*

## The Forest.

### The Catalpa speciosa for Timber Planting.

I READ with interest the address of Mr. Burnet Landreth, in GARDEN AND FOREST (December 12th, vol. i., p. 500), on "Forest Planting in Virginia," although to one about to start a young forest Mr. Landreth's experience would not be very encouraging. Forest planting, however, can be made a success if the right trees are planted and proper care given for only a few years. An improper selection of trees is the cause of most failures. Why should so many trees be recommended, when a very few would answer every purpose? For a timber tree in the central part of the United States (including the great corn-producing States, Ohio, Indiana, Illinois, Iowa, Missouri, Kansas and Nebraska), no other tree is equal to *Catalpa speciosa*. It is very easy to grow from seed, transplants from nursery to field better than any other, and, after a plantation is once set, it is as easily cared for as so much corn. In three years from planting the trees will almost completely shade the ground, keep out weeds and retain moisture, and then cultivating can be dispensed with.

These trees should always be planted four feet by four, and at from nine to fifteen years the trees can be thinned so as to stand eight feet apart each way. If planted closely they will trim themselves, and, in time, grow into tall, straight trees. But while close planting helps the young trees, thinning should not be delayed too long or the entire grove will suffer. The value of the tree for posts alone makes it the very best kind to plant for profit, as it only takes a few years to grow one large enough for fence posts, while many other forest trees—notably Black Walnut, Red Cedar and White Pine—are worth very little while young. In the prairie region of Kansas and Nebraska the demand for posts is very great, the prices are good and likely to improve. What the forest tree planter wants is a tree that will grow into usefulness in a dozen years. To plant trees that will take forty or fifty years to have a market value, requires too much trust in the future. White Ash would be the best tree in many places, for it can be used even earlier than the Catalpa.

Desiring to ascertain, for my own information, what tree would best endure dry, hot weather, I examined many groves during the dry period of July, 1886. I visited the Farlington forests, located in Crawford County, Kansas, and composed mostly of *Catalpa speciosa*. They are from five to eight years planted. Small bodies of Ailanthus, Osage Orange, White Ash and Black Walnut were scattered among them. These forests cover a section of prairie (640 acres) located in an exposed and treeless region, having, at the time, no protection from the prevailing strong winds.

This immense body of trees having passed through a long period of intense heat, without rain, was healthy and vigorous, and had made an annual wood growth that was surprising. Among the trees the ground was in fine condition, with plenty of moisture, and that, too, when the thermometer stood at 104° in the shade.

They had not been cultivated for some years, but their foliage had formed a complete shade to the land, stopping the growth of weeds and grass and restraining evaporation from the soil.

The Ailanthus showed no signs of dry weather. Black Walnut and Osage Orange looked very well, but were making a very slow growth. White Ash was making feeble growth, and showed the injurious effects of the intense heat.

The Catalpa-trees at Fort Scott, Topeka, and in a grove in Morris County, Kansas, were also examined, and in each case were found doing better than any other tree.

Observations during the last two years have confirmed the belief that under our trying prairie climate this tree has no rival for forest planting. The wood is beautiful, and takes a fine polish; for durability in posts and fencing material it is only equaled by the Red Cedar and Black Locust.

So far as I can see, there is little danger of failure with the Catalpa here. Close planting seems to be the one thing needed, so that the ground may receive as soon as possible that shading which is always afforded by natural forest-growth.

Topeka, Kansas. *G. W. Fincher.*

[As our correspondent insists, the first and most essential step in tree-planting is the selection of trees suited to the climate and the soil of the locality in which the plantations are to be made. The importance of knowledge of the requirements of trees, and the unsatisfactory results which must follow the planting of trees where their nature and wants are not understood, are made apparent by the result of the tree-planting experiments recently described in this journal.

A little knowledge, the result of the most casual observation, would have shown the men who competed in Massachusetts for the prizes offered by the Trustees of the Agricultural Society of that state, that they could not hope to induce the White Ash to grow to any size or value upon thin, gravelly, worn out drift, upon which they would not have found an Ash-tree of any size growing naturally.

Mr. Landreth's experiments in tree-planting in eastern Virginia (see vol. 1, p. 500) show too, that observation of natural conditions may save useless expenditures of time, energy and money. The soil with which he had to deal was never very strong, and it had been practically exhausted by long years of cultivation upon the wasteful principles which have ruined much of the soil of the south Atlantic sea-board States. Upon this soil, when fire is kept away, the Loblolly, or Old Field Pine (*Pinus Tæda*), springs up in the greatest profusion, and, during many years, grows with great rapidity. But the presence of this tree shows that the land is of poor quality, and that it has been so impoverished that other trees cannot grow vigorously in these old fields with the Pines. A knowledge of the Loblolly Pine and its habits might have saved all the cost and trouble of these plantations, which lead only to the inevitable conclusion, that the best tree for any particular climate or soil or location is the one which is growing naturally and flourishing in that climate and location and upon that soil; and that in eastern North America the planting of trees in forests is not so much needed as the care of the trees which spring up freely in all situations and upon all soils.

The absence of trees, due to causes not entirely climatic, from the region extending along the eastern border of the dry and treeless central plateau of the continent, made experiments in tree-planting in this part of the country necessary in order to establish the fact that trees could be grown there successfully on a large scale, and to determine the varieties of trees best suited to flourish under conditions in which the controlling features were dry and hot summers, cold winters, fierce winds at all seasons of the year, and deep and very rich soil.

The large plantations at Farlington, in eastern Kansas, described by our correspondent, were made for the special object of determining what trees would thrive under these peculiar conditions; and while sufficient time has not yet passed since the trees were planted to make the result conclusive in any way, it is evident that the Western Catalpa is the most promising tree which has yet been tried to any extent on the western prairies. It is not wise,

however, to decide hastily in regard to the value of any tree for planting under conditions quite dissimilar to those in which it grows naturally.

The Western Catalpa is confined to a comparatively small area, of which the junction of the Ohio and Mississippi Rivers may be taken as the centre; it grows only in deep, river-bottom lands, which are often submerged for weeks together; and while it flourishes while young, growing with remarkable rapidity when planted under conditions entirely dissimilar to those under which this species has been produced, it has not been tested yet long enough in cultivation to enable any one to speak with entire positiveness of its adaptability to prairie-planting. The fact that it becomes valuable for many purposes in comparatively few years, is a great point in its favor, as many trees, placed in the midst of abnormal surroundings, thrive for many years and do not display their inability to adapt themselves to new conditions until they begin to approach maturity.—ED.]

## Correspondence.

To the Editor of GARDEN AND FOREST:

Sir.—In one of your recent numbers you spoke of experiments in the use of elastic cement for filling decayed places in the trunks and limbs of trees, resulting from neglected amputations. Can you refer me to any parties for particulars and for the purchase of the proper article? I have heard of introducing cotton-batting, steeped in turpentine, and then closing over tight.

It seems as if this subject of tree-doctoring is of sufficient importance to justify a hope of some attention in your columns, for general use. *G. M. Weld.*

New York.

[We have had no experience in the use of elastic cement for filling the cavities in the trunks and branches of trees. The method recommended for the treatment of trees in this condition is as follows: The edge of the cavity should be cut away smooth and even, and all decomposed matter or growth of new bark formed in the interior should be removed. A coating of coal-tar should then be applied to the surface of the cavity, and the mouth protected with a piece of well-seasoned oak securely driven into it. The end of this plug should be cut even with the surface of the trunk or limb, made perfectly smooth, and then coated with coal-tar. If the cavity is too large to be closed in this manner, a piece of seasoned oak-board should be fitted and securely nailed into it, and then covered with coal-tar. A new growth of bark will gradually extend over the board and so effectually cover the cavity.—ED.]

### About Kniphofias.

To the Editor of GARDEN AND FOREST:

Sir.—In the article by Mr. T. D. Hatfield concerning these plants I observe a few slight errors, arising, probably, from want of true material, which I hope he will kindly permit me to amend.

The name of *K. carnosa* has been given by erroneous distinction and bad handwriting; the plant certainly is but *K. Leichtlinii*. *K. media*, of Gawler, identical with *K. sarmentosa*, Kunth, is a very distinct plant, and differs in many points from *K. aloides*, Mœnch. The former has broader and shorter leaves, which are glaucous. It has a longer flower-stem, and the flower-spike has a different form from that of *K. aloides*; while the flowers of *K. aloides* are fiery red to yellow, those of *K. media* are somewhat rainbow-colored, at first greenish-brown, then changing to blood-red, and finally turning to a sulphury yellow, the whole spike shaded off by a thick glaucous bloom, which causes the colors to appear very dull. *K. nobilis* and *K. Saundersi* are very distinct plants, and far superior to *K. grandis* or *K. grandiflora*. *K. nobilis*, which may be considered a giant variety of *K. aloides*, was discovered by Mr. Parker in a small garden near London, and *K. Saundersi* I found in the garden of Mr. W. Wilson Saunders, at Worthing, probably a remnant of Mr. Cooper's introductions from Caffraria. I am inclined to take *K. Saundersi* as a species. The two plants look very much alike, except in the flowers; the foliage looks coarse and robust, that of *K. Saundersi* being a little narrower and deeper green; the stems reach up to five feet; the spikes of *K. nobilis* are of an ovoid shape, being thickest in the middle; its color is a fiery scarlet turning to deep bright yellow, and its size is eight inches long by more than four inches wide. The spikes of *K. Saundersi* are cylindrical, scarlet, with a brick-red shade turning yellowish. The spike is thirteen inches long and three and a half inches in diameter. This is by far the noblest of the whole genus. I have of late raised some most beautiful hybrids and varieties; a blood red and a golden yellow variety of *K. Leichtlinii*, and among the hybrids some bright canary-yellow ones, and others with anthers far protruding, looking just like a brush. The small-flowered *K. albiflora*, introduced by myself from Madagascar, is pretty, but of botanical interest mainly. *K. Natalensis*, which flowered here for the first time in Europe, is not very showy, yet highly interesting; the spikes being over two feet long, loosely beset with narrow flowers of a foxy brown color.

Baden-Baden, December, 1888. *Max Leichtlin.*

## Periodical Literature.

The December number of the *Bulletin of Miscellaneous Information*, issued by the Royal Gardens at Kew, completes the second volume of this useful publication, from which we have more than once had occasion to make copious extracts. The present number contains articles on Inhambane Copal (*Copaifera Gorskiana*), a new tropical-African product, from which it appears that "the term copal is commercially applied to various hard gum-resins yielded by certain tropical and sub-tropical trees. In the majority of cases copal is obtained in a semi-fossil state on land where no trees at present are found, but where at one time large forests existed. In other cases, what may be termed recent copal is a gum-resin in a comparatively fresh state, collected from living trees or from trees in a state of decay.

There is also an exhaustive report upon the cultivation of Rice in Bengal, which should be reprinted for the benefit of the rice-planters of the Southern States.

The Silkworm Thorn of China (*Cadrania triloba*), which has been successfully introduced into the Royal Gardens, is described. There are notes upon a new rubber-producing plant of Jamaica (*Forsteronia floribunda*), and upon some supposed seedlings of the Sugar-cane which have been detected at Barbadoes, and which are of special interest, as the following extracts will show:

"The Sugar-cane is one of the most valuable economic plants we possess. It has been cultivated for so long a period that the primitive habitat of the species, according to De Candolle, is unknown. Bentham, in the "Flora of Hong Kong," page 420, states that 'We have no authentic record of any really wild station of the common Sugar-cane.' Further than this, in common with many plants that have been for a long time under cultivation, and reproduced solely by means of buds and suckers, the Sugar-cane so rarely produces mature fruits that no one, as far as we are aware, has ever seen them. Certainly in the rich Hebarium at Kew there are no seed-bearing specimens. In botanical works the subject is often referred to, but apparently only to restate the fact that botanists like McFadyen, in the West Indies, and Roxburgh, in India, 'have never seen the seeds of the Sugar-cane.'

"Schacht is one of the few persons who has given a good analysis of the flower of the Sugar-cane, including the pistil; he also had not seen the ripe seed.

"In discussing the problem how far the saccharine qualities of Sugar-cane could be improved on the same lines as those so successfully adopted with regard to the Beet, it was lately pointed out in a letter addressed to the Colonial Office that, owing to the power of producing fertile seeds having apparently been lost in the Sugar-cane, it was impracticable to deal with it by means of cross-fertilization or by the ordinary course of seminal selection. It was further pointed out that new and improved varieties amongst Sugar-canes were to be looked for amongst bud variations, and planters were advised to mark any canes that showed a departure from the type and cultivate them separately for experimental purposes, with a view to test their yield in sugar.

"Recently, however, a statement has reached Kew from a trustworthy source that seedling Sugar-canes have been found at Barbadoes, and that the plants were in course of being raised at the Botanical Station in that island, under the care of Mr. Harrison and Mr. Bovell.

"The statement sent by Professor Harrison appears to prove, in a perfectly natural and circumstantial manner, that a few mature seeds may occasionally be produced by the

Sugar-cane under certain circumstances. It is stated by Rumphius that the Sugar-cane 'never produces flowers or fruit unless it has remained several years in a stony place.' He does not, however, say whether he ever saw the fruit, nor does he cite any proof of the fact in the shape of seedlings, self-sown or otherwise. The canes that would be likely to produce fruit would be those varieties nearest the original wild cane, and probably on that account they would be less rich in sugar than the canes improved by a long course of cultivation.

"Without expressing a decided opinion on the subject, and in the absence of the specimens themselves, the information supplied by Professor Harrison is, so far, the most tangible of any yet received to show that the cultivated Sugar-cane may occasionally produce mature fruits."

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The December number of the *English Illustrated Magazine* contains a charming article by Mr. Grant Allen on "Surrey Farmhouses." Many Americans know the beautiful village of Dorking, not far from London, and those who are familiar with that delightful book, Cobbett's "Rural Rides," have some idea of the surrounding country. But even among Londoners there are few who have realized its loveliness for themselves or seen its richness in examples of domestic architecture. It is one of the most primitive districts in all England, despite its proximity to the capital; for its heavy clay soil has prevented agricultural advance. But in the sixteenth century it had what Mr. Allen calls a temporary "boom" from the discovery of iron-ore in its hillsides, and the consequent enrichment of many families has left its trace in beautiful manor houses, while nowhere have so many old farmhouses escaped the hand of modern progress. The "Weald of Surrey," as it is called, once formed part of the famous "Andreaswald"—the impenetrable forest which withstood the feet of the advancing Saxons and furnished a refuge for the Britons whom they displaced; and in the aspect of its present population Mr. Allen thinks he can read patent signs of Celtic descent. "The great characteristics of the Surrey village," he writes, "are green and common. No county in England, perhaps, except Yorkshire, Devonshire and the Cumbrian shires, has so large a proportion of its area still uninclosed. As late as Queen Anne's day Holmwood was a deer-forest, and . . . for miles even now one may traverse the open heather and bracken along the sandstone hills; while on the plain itself the amount of open common always surprises the stranger in a Surrey district. The fact is, till very recently, land in Surrey had but a ridiculously small value. The county remained very sparsely inhabited, and the area for the most part was unfit for tillage. Hence every hamlet had its corner of green, and it is the existence of these universal cricket-fields at their very doors, with the consequent practice from early childhood, that has made the Surrey men the champions of England." But, interesting as is Mr. Allen's text, we desire especially to call our readers' attention to the numerous pictures which accompany it. Perhaps they do not deserve, from the point of view of artistic execution, the very enthusiastic praise which the author gives them; but they show, at all events, an exceptional feeling for the most picturesque points of view and much skill in the rendering of tree forms; and the subjects themselves are so charming, that we should be glad to see them even though the pictures had much less artistic merit than they possess. Most of the houses are of half-timbered construction, with beautiful tall polygonal chimneys and many gables; and helpful lessons for our own practice may be gained from them, as they show how a diversified ground-plan need not give a disjointed, heterogeneous look to a house, and how broken roofs and conspicuous gables of different sizes may be brought into a result of the greatest harmony and charm. Only, in studying such houses as these, it must not be forgotten that time has added vastly to their picturesqueness. If one of these gabled houses were to be copied exactly, it would by no means have exactly the same effect—great softness and grace having often been given by such practically unfortunate facts as a sagging of the roof-ridge and a slight inclination in the walls. Nor could one immediately imitate the charming effects produced by the trees and shrubs that grow so harmoniously up to the very base-course, and by the mellowing mosses, grasses and flowers that, in the damp English climate, have seized upon every smallest foothold in brick or stone. Nevertheless there is much to be learned from these pictures, as well as much to be enjoyed by the mere casual observer.

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Mr. Arthur Hollick contributes to the December number of the *Bulletin of the Torrey Botanical Club* an interesting account of a group of remarkable Oaks recently detected near Tottenville, on Staten Island, and containing plants of a supposed hybrid between *Quercus Phellos* and *Q. nigra*, which has been described by Dr. Britton as *Quercus Rudkini*, and of *Quercus heterophylla*, the Bartram Oak, the range of which is now extended considerably further north than it has been known before. This is the plant which has, for a century almost, been the subject of active discussion on the part of various botanists who have studied our Oaks. It has been considered a species by some, and by others a hybrid between *Q. Phellos* and one of the other Black Oaks—*Q. aquatica*, *Q. imbricaria*, *Q. falcata*, *Q. coccinea*, *Q. tinctoria* and *Q. palustris*, all being made to serve in turn as the other parent. Mr. Hollick agrees with those botanists who believe that *Q. heterophylla* is a hybrid derived from *Q. Phellos*, but he discards all the species which have been named as the other parent, and suggests that it is *Q. rubra*, arguing that the shallow cup of the supposed hybrid attaches it to that species, which, moreover, he believes is the only Black Oak constantly found growing in the neighborhood of *Q. Phellos* in the region occupied by *Q. heterophylla*.

Every additional station of *Q. heterophylla* which is found—and it is now known in many places between Staten Island and Newcastle County, in Delaware, besides having been collected in North Carolina by Curtis (*vide* Herb. Canby), and by Hall in Texas—would seem to confirm the ideas of those botanists who have considered it a species of recent hybrid origin, perhaps, but now fixed in its characters to the degree of being able to reproduce itself exactly from seed. The important thing, however, is that the tree exists, and that there is no confusion in regard to its name, which is not obscured under a mass of useless and annoying synonyms. Its origin and parentage cannot be accurately determined, and must always, of necessity, remain a matter of personal opinion.

## Recent Plant Portraits.

PITTOSPORUM PHILLYROIDES, *Bulletino de la R. Soc. Toscana de Orticultura*, November.

*Botanical Magazine*, December:

BEGONIA SCHARFFEI, *t.* 7028; a native of the Peninsula of Destierra, in southern Brazil; and described by Sir Joseph Hooker as "one of the most magnificent species of the whole genus."

IRIS SUWAROWI, *t.* 7029; another distinct Iris recently discovered in central Asia by Dr. Albert Regel.

PENTAPERA SICULA, *t.* 7030; a low, much-branched, Heath-like shrub; a native of Sicily, Cyprus and Barca, and the only representative of a genus distinguished from the true Heaths by its pentamerous flowers (which Sir Joseph Hooker points out is not a constant character), by its large sepals and pubescent ovary. The flowers are larger than those of the other European Heaths, and are pure white.

HEXISIA BIDENTATA, *t.* 7031; a small Central American Orchid, with scarlet flowers, which possess a botanical rather than a horticultural interest.

PRIMULA RUSBYI, *t.* 7032; a native of the mountains of southern New Mexico and Arizona, already described in the columns of GARDEN AND FOREST, p. 320.

ARUNDINA BAMBUSÆFOLIA, *Gardeners' Chronicle*, December 1st.

DISA LACERA, var. MULTIFIDA, *Gardeners' Chronicle*, December 8th.

DISA GRANDIFLORA, *Gardeners' Chronicle*, December 8th.

NEPENTHES RUFESCENS, *Gardeners' Chronicle*, December 8th; "this is stated to be a cross between *N. Courtii* × and *N. Zeylanica rubra*. *N. Courtii* is itself a cross between an unnamed Bornean species and *N. Dominiana* ×, this latter being a cross between *N. Rafflesiana* and the same undetermined Bornean species."

PHILLYREA DECORA, *Gardeners' Chronicle*, December; this is the *Phillyrea Vilmoraniana* of many gardens; a native of the shores of the Black Sea, and a member of the Olive family. It is a strikingly handsome shrub, with bright green, coriaceous leaves and axillary clusters of white flowers, which are followed in the autumn by olive-shaped, reddish-purple fruit. It is specially recommended for planting in cities, as smoke and dust does not affect it seriously. Its hardiness in this country, however, has not been established yet.

KALMIA LATIFOLIA PAVARTI, *Revue Horticole*, December 1st; a handsome variety of the common American Laurel, with high-colored, almost red, flowers, obtained in the garden of the Trianon by Monsieur Pavart.

QUERCUS RUBRA, *Bulletin Torrey Botanical Club*, *t.* 83, December.

QUERCUS PHELLOS, *Bulletin Torrey Botanical Club*, *t.* 83, December.

## Notes.

Dr. Regel, in a private note, calls attention to the interesting fact that *Picea pungens*, the so-called Colorado or Blue Spruce of the Central Rocky Mountains, is by far the hardiest and most desirable of all the Spruces in the very severe and trying climate of St. Petersburg.

Among flowers forced for the holiday trade in this city were both white and red varieties of the Japan Quince. The white was especially admired, making a satisfactory substitute for Orange blossoms. These plants flower under glass as readily as Lilacs. They are grown in pots for a year before being forced, to encourage an abundant growth of roots.

Professor B. D. Halsted, of the Agricultural College of Iowa, will remove next month to New Brunswick, New Jersey, to accept the Chair of Botany in Rutger's College, and to assume charge of the Horticultural Department of the Agricultural Experiment Station. Professor Halsted will continue his special study of American weeds, and will be glad to receive reports in regard to plant pests from any part of the continent.

The value of the so-called Japanese Ivy (*Ampelopsis Veitchii*) for use along railroads is rapidly being recognized. Its compact, clinging habit serves to bind together loose stones and shaly surfaces, thus protecting the sides of embankments and cuttings, and in consequence the track itself, while delighting, in summer, the eyes of the weary traveler. Thousands of plants are already sold each year to railroad companies.

During the past season Mr. A. A. Crozier cross-fertilized a large number of the blossoms of different kinds of Apples, Pears, Plums, Grapes and Squashes, with a view to ascertain whether any effect from the cross appears in the fruit of the first year. An account of the results of these tests is given in full in the December number of *Agricultural Science*, and in no case could the influence of the variety furnishing the pollen be detected in the fruit.

The cultivation of flowers for the manufacture of perfumes has been begun in this country with seemingly good results. A company already exists in Florida which has planted for this purpose 200 acres in Tuberoses, while a correspondent of *The American Garden* writes from South Carolina that the preparation of pomades is easily practiced by individuals, and that she is herself engaged in it, having planted this fall 150,000 Tuberoses (which require three acres of ground) and about double the quantity of Jonquils, and having engaged 10,000 roots of Violets for spring planting.

The teak baskets which are commonly used in England for growing epiphytal Orchids are made of wood obtained from broken-up ships in the London docks. The wood is supplied in square rods about as long as ordinary builders' laths, though, of course, a good deal thicker. The edges of the rods are rounded off, and then they are cut into the required lengths and pierced at each end with holes, through which copper wires are inserted to bind them together. Such baskets are said to last from ten to twelve years if thoroughly cleansed whenever a plant is removed from them. They are furnished in every size from three inches to a yard square.

Among the newer and more promising varieties of Grapes is a very early, greenish-white one, first brought to notice by Mr. James M. Paul, of North Adams, Massachusetts, who found it growing wild in the Green Mountains, after which it has been named. Mr. E. S. Goff, who has fruited this Grape for the past two seasons, writes in *Popular Gardening* that it ripens about with Champion, while in quality it ranks with the best. The vine is vigorous and quite productive, bearing medium-sized, not very compact bunches, with berries a little larger than those of the Delaware. The flesh is quite free from hard pulp, and entirely without harshness or foxiness, and its flavor is very sweet, with a slight inclination toward the vinous. The Green Mountain is the only Grape so far tested at the New York Experiment Station which is at once very early and of the best quality.

The meeting of the Illinois State Agricultural Society held last week proved unusually profitable and pleasant. The managers made a special effort to secure a fine display of fruit, and especially of new varieties from all parts of the state, and so many liberal premiums were offered, that all exhibitors of fine specimens were sure of gaining something to help pay expenses. These facts were well advertised through the press and by private letters, and as a result, the attendance was very large, even the remote parts of the state being well represented. One session of the meeting was conducted entirely by the young people, who read carefully prepared papers and discussed the subjects presented with such intelligence, that the session was pronounced the most interesting of the entire series. It is probable that other states will follow the example of Illinois in this particular, as it promises to encourage the study and practice of certain branches of horticulture among the boys and girls from the farms, as well as those in towns and cities.

We have already referred to Dr. Ernst's first article, published in the *Gartenflora*, on "Horticulture in Caracas." It has been followed by a second chapter that contains much interesting information with regard to the plants which flourish in the Venezuelan climate, and those which, upon trial, have been found ill suited to it. The cultivation of useful plants, he tells us, has lagged so far behind that of flowering and ornamental plants, that it is no exaggeration to say, not a single new fruit or vegetable has been introduced into the country during the last fifty years. On the other hand, the prices paid for flowers are enormous, running so high in the case of native Orchids, that their re-importation from England may prove profitable. A specimen of *Cattleya Wagneriana*, with twelve leaves and eight blossoms, had recently been offered to the author for $45, and he attributes such demands to the fact, that collectors for English firms have given such enormous sums for white-flowering Cattleyas, that the natives in consequence have "lost their heads" to a degree which can only be cured by a persistent abstention from purchase on the part of local customers. That they have by no means lost their cunning, is shown by the statement that they treat the common *Cattleya Mossiæ* with sulphur fumes so as to make it look like *C. Reineckiana*, bring the plants bearing these blanched blossoms to unsuspecting amateurs in twilight hours, and often receive large prices for them.

Professor L. H. Bailey recently contributed to *The American Garden* some "Rural Notes from Scandinavia," from which we extract the following passages: "In ornamental gardening the traveler finds much to admire, particularly in Sweden. There is not that richness of finish and variety of plants which one sees in England, but there is usually a most excellent and tasteful use of materials. The Slots Park, at Christiania, is an admirable example of the adaptation of common plants to ornamental gardening of a high character. The greater part of the plantings are Birches and Elms, trees which everywhere clothe the adjacent hill-sides. Perhaps the very contrast of this simple park with the ornate and burdened ones of England and other parts of Europe may heighten its charms in the mind of the traveler. Yet one must feel that the absence of effort and artifice and the repose which comes from the very simplicity of its design and details gives this park an intrinsic merit. Parks are usually burdened with accessories, mere display, a feature of gardening—if gardening it can be called—which is supported and often demanded by the popular desire for show and curiosities. One extreme in this direction now holds rule in America—the craze for carpet-bedding, which is so generally and so unfortunately denominated landscape-gardening! It is said that American carpet-bedding 'beats the world,' and my own observation thus far sustains the boast, much to the credit of other countries."

At the International Exposition held at Barcelona during the past season, the Department of Forestry was a conspicuous feature. It embraced general forest maps of Spain and more detailed maps of the different provinces; maps showing the distribution of the most important trees, such as the Aleppo Pine, the Beech, Cork Oak, etc.; a herbarium of the plants of the forest; relief plans of the Mountain of Covadonga, and of the Dunes of Cadiz, with their artificial plantations, plans for forest cottages for workingmen and forest guardians. One of the most interesting things in the exhibition was a scheme for the establishment of a telegraph system to announce fires in the forest. A detailed forest map of the Philippine Islands was contributed from the Bureau of the Minister of Foreign Affairs. The second section of the exhibition contained a large collection of forest products, such as woods, resins, barks, various textile products, specimens of charcoal and seeds of trees. In this collection there is also a very large collection of woods and other industrial and economic products of the Philippines. All the instruments used in the Spanish Forest Department were displayed, while upon a lawn near the exhibition building, a miniature mountain was created, upon which were shown, of the size of life, the different methods used for transporting wood from mountain forests, such as slides, narrow gauge railroads, and the like. A collection of insects, wild animals and fish collected in the Spanish forests, made another group of this exhibition, which was probably the most complete and interesting seen in Europe for many years.